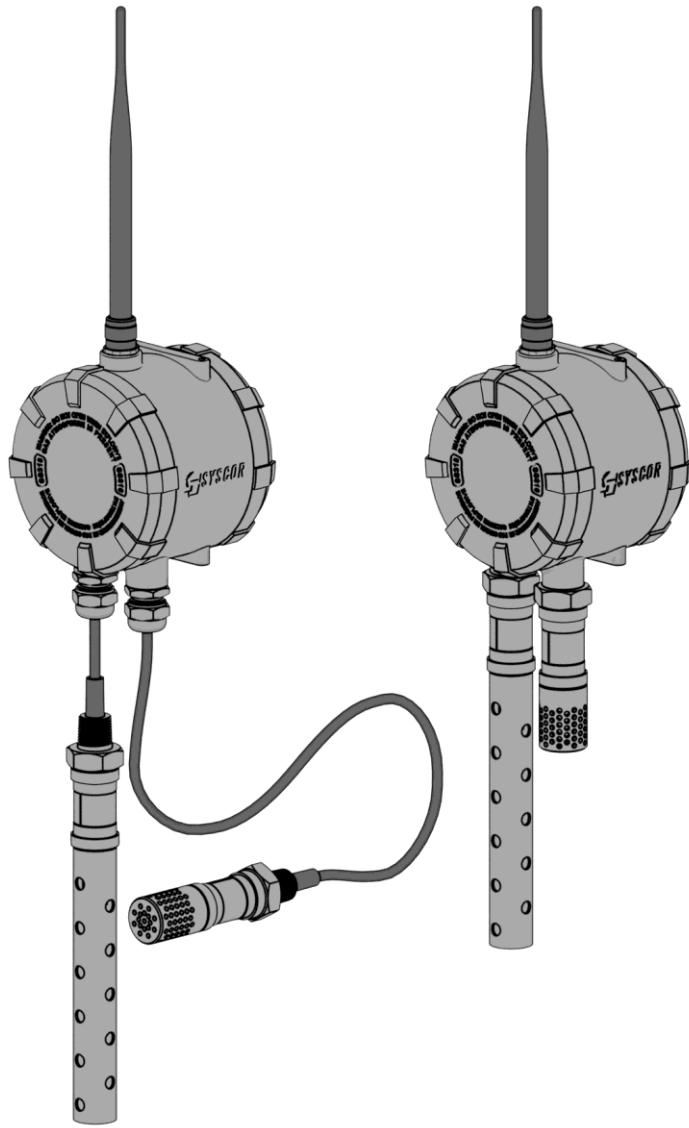


# Power and Communication Unit

## Quick Start Installation

### User Manual

Rev. 1.4.0



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# 1 General

## 1.1 Device Overview

The power and communication unit (PCU) is an intrinsically safe, IEEE 802.15.4 2.4GHz device. The PCU can be paired with additional sensors which are capable of detecting the presence of hydrocarbons in the air, water and ground. Two field-interchangeable sensors provide detection of hydrocarbons, temperature, inclination, acceleration and liquid height. Sensor measurement readings are communicated along with network and battery status via the wireless mesh communication protocol. The PCU seamlessly integrates with existing SCADA and asset management systems.

Sensors approved for use:

- Hydrocarbon liquid and vapor detector (HCD)
- Hydrocarbon liquid and vapor detector with a water level sensor (HCDW)

**WARNING: Only sensors provided by Syscor are compatible with this device.**

**WARNING: Do not attempt to disassemble the sensors as this could damage the sensor, void hazardous location approvals and the manufacturer's warranty.**

**WARNING: Device protection may be impaired if used in a manner not specified by Syscor.**

**WARNING: Do not open in an explosive gas atmosphere.**

## 1.2 Device Approvals

### 1.2.1 Intrinsic Safety

The PCU, HCD and HCDW products have been certified for operation in hazardous locations under the following parameters and conditions:

- Class 1, Division 1, Groups C, and D;
- Intrinsically safe Exia;
- Ambient temperature range -40°C to +60°C, Temperature Code T4;
- PCU enclosure is Type 4X IP67; and
- HCD & HCDW enclosures are Type 4X IP68.

Specific Conditions of Use (Antenna):

- 1) A passive antenna may be supplied by Syscor or provided by the customer. Permitted antennas must have <10000mm<sup>2</sup> plastic surface when screwed in directly to the enclosure. Antennas mounted via cable are not subject to the plastic surface area restriction.
- 2) Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment (i.e. a plastic antenna) may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conductive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.
- 3) Only battery powered field communicators may be used with the HART maintenance port.

**WARNING: Substitution of components not expressly specified by Syscor will void intrinsic safety certification.**

## 1.2.2 Federal Communications Commission (FCC) Part 15

This device complies with FCC Rules Part 15 operation and is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Changes or modifications to this device, not expressly approved by Syscor Controls & Automation Inc. could void the user's authority to operate the equipment.

FCC RF Exposure Requirements:

This product complies with the FCC RF exposure limit set forth for an uncontrolled environment and is safe for intended operation as described in this manual. This device is only authorized for use in a mobile application, at least 20 cm of separation distance between the radiating antenna and the user's body must be maintained at all times. Further RF exposure reduction can be achieved if the product can be kept as far as possible from the user's body or set the device to a lower output power if such a function is available. Separate approval is required for all other operating configurations, including portable configurations with respect to 47 CFR Part 2.1093 and different antenna configurations.

## 1.2.3 Industry Canada

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage;
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## 1.2.4 Antennas

The radio transmitter 11413A-000697 is approved by to operate with the antenna types listed below. Antenna types not included in this list, or having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device. In order to comply with FCC regulations pertaining to the use of generic antenna connectors, this device must be professionally installed.

- 1) Omni-Directional Antenna Type
  - a. Maximum permissible gain of 12.0dBi (North America) or 6.0dBi (Europe)
  - b. Impedance 50 Ω
  - c. <10000mm<sup>2</sup> non-metallic surface area. If used with any length extension cable ignore this requirement.
- 2) Patch Antenna Type
  - a. Maximum permissible gain of 4.9dBi (North America and Europe)

- b. Impedance 50 Ω

## 2 Installation

### 2.1 Location Planning

PCU location will depend on availability of mounting locations and presence of possible interference for wireless network transmission. Sensor location will be dictated largely by the needs of the system being monitored. A variety of options are available for mounting both the sensor and PCU together or separately as needed.

Range of permitted environmental conditions:

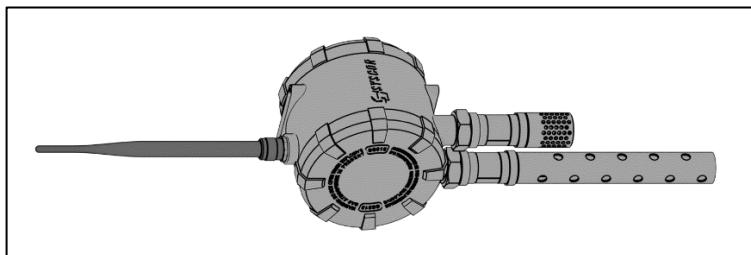
- Indoor / outdoor
- Pollution degree 4
- Water submersion to a depth of 1m
- -40 to +60 Celsius ambient temperature

#### 2.1.1 Sensor and PCU Placement Considerations



Sensors are provided with cable permitting remote mounting. Combined cable length cannot exceed 10 meters or 33 ft.

Figure 1: PCU with cable-mounted sensors



Sensors may also be mounted directly to the sensor ports on the bottom of the PCU rather than remote mounted.

Figure 2: PCU with body-mounted sensors



Both the PCU and the sensors use standard  $\frac{1}{2}$ " NPT threads for assembly. For locations where more durability is required, sensors may be mounted using standard  $\frac{1}{2}$ " NPT threaded pipe and associated fittings to protect the sensor cable.

Figure 3: PCU with rigid pipe-mounted sensor



The PCU may be mounted anywhere a convenient mounting surface is available. A generic mount may be used for mounting on a strut channel with magnetic hardware, which enables the device to be attached directly to a pipe flange or flat surface. Syscor mounting hardware uses up to three Neodymium grade N38 magnets each with a pull force of 90.4 lbs.

Figure 4: PCU with magnetic mount to pipe flange

## 2.2 Generic Mounting Bracket

The Generic Mounting Bracket allows for mounting in a number of locations using a variety of hardware. The hole pattern on the bracket is sized to allow for:

- U-Bolt mounting in horizontal and vertical orientations.
- Strut Channel mounting in a number of orientations depending on holes selected.
- Even screw mounting directly to metal or wood substrates.

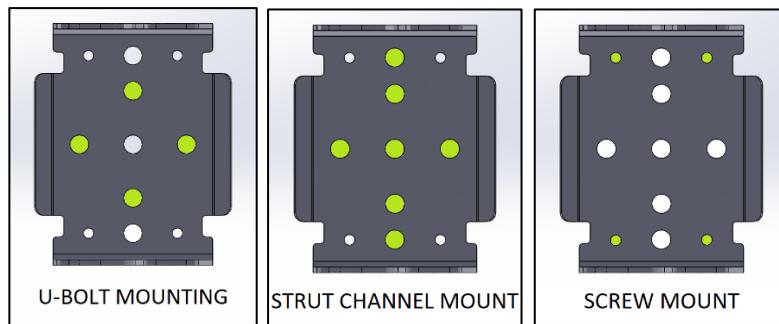


Figure 5: Variety of mounting options with generic bracket

For Strut Channel mounting it is recommended that a minimum of two screws be used with the Generic Mounting Bracket.

The PCU mounts to the Generic Mounting Bracket using Qty. 4 #10-32 screws and star washers as shown.

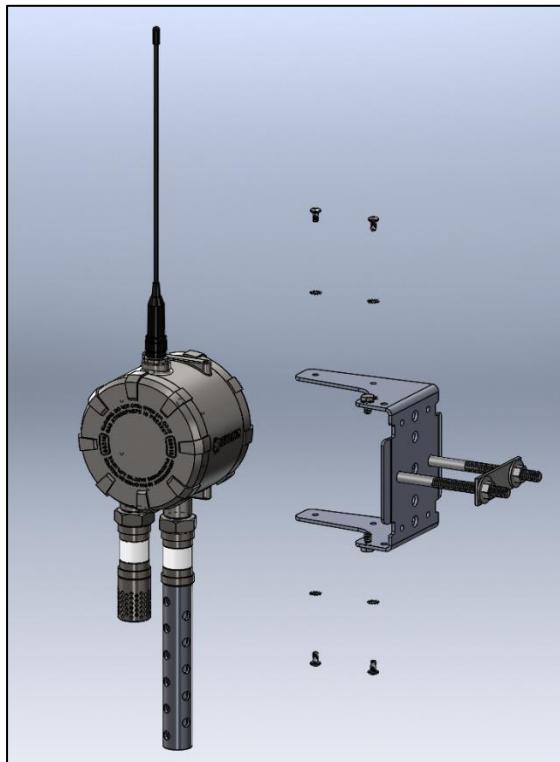


Figure 6: Sample generic mounting bracket configuration

## 2.3 Magnetic Surface Mounting Bracket

The Magnetic Surface Mounting Bracket is intended for applications where the inclinometer on the PCU is used, but not exclusive to this application. The base assembly of the bracket is dropped into place on a nominally level magnetic surface. Next, the U-shaped part of the bracket is placed on top and rotated into the desired orientation. Finally, the bracket is locked in place with the wingnut provided. Please check <https://www.syscor.com/support/downloads> for additional instruction before proceeding with installation.

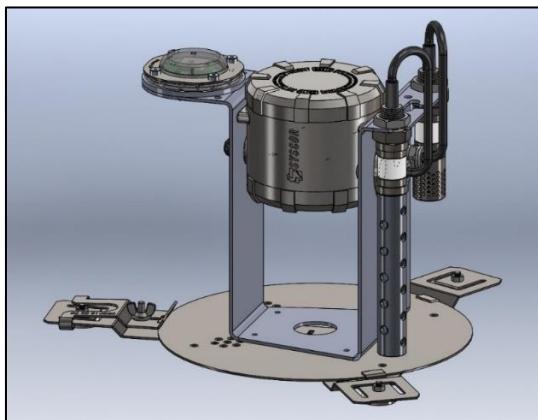


Figure 7: Magnetic mounting for hazardous locations

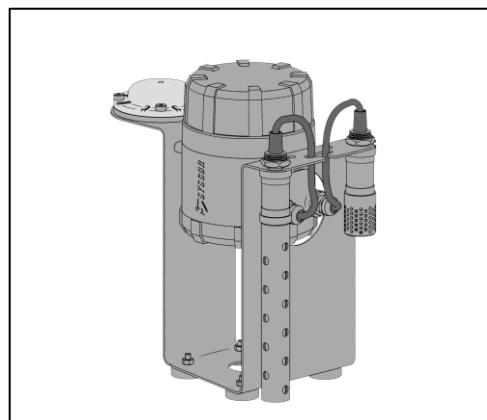


Figure 8: U-shaped part of bracket

## 2.4 Wiring Sensors to the Power and Communication Unit

Up to two sensor probes may be connected to the PCU. Sensor probes may be screwed directly into the PCU ports or mounted remotely. For systems with zero sensor probes, ensure both PCU cable glands have a plug installed. Plugs are shipped with every PCU but can be purchased from the manufacturer separately if misplaced or lost. Please read the warnings regarding field replacement at the end of section 2.4.

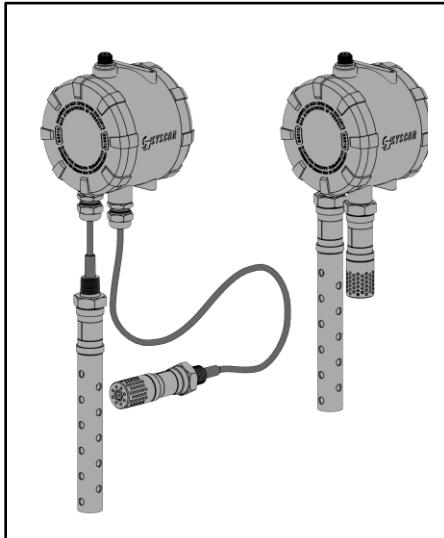


Figure 9: Remote and directly mounted units

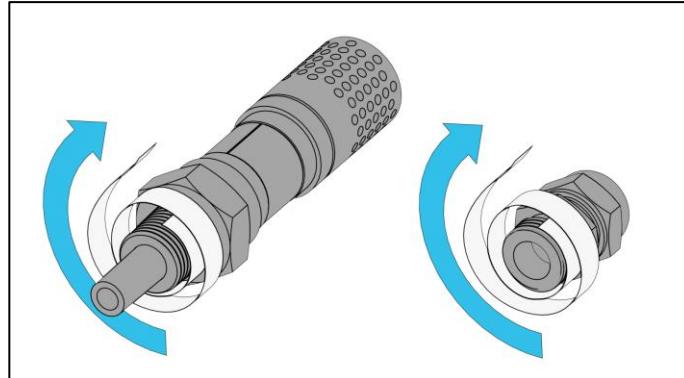


Figure 10: Direct mounted PTFE tape application  
(See 2.4.1 for installation instructions)

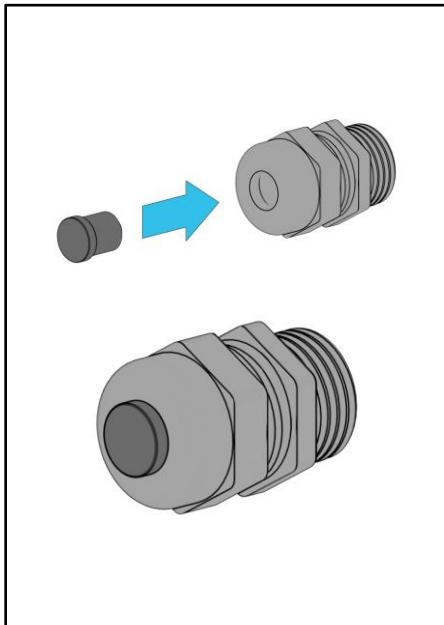


Figure 11: Inserting plug into unused gland

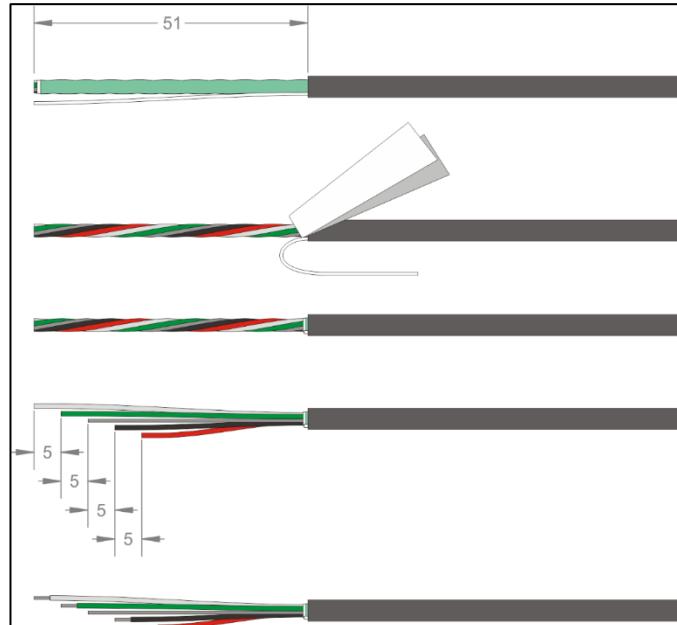


Figure 12: Direct and remote sensor probe wire preparation  
(see 2.4.1 or 2.4.2 for installation instructions)

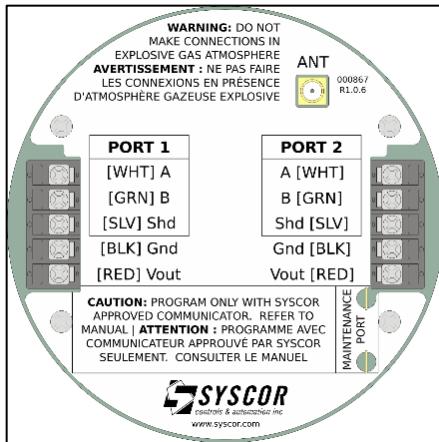
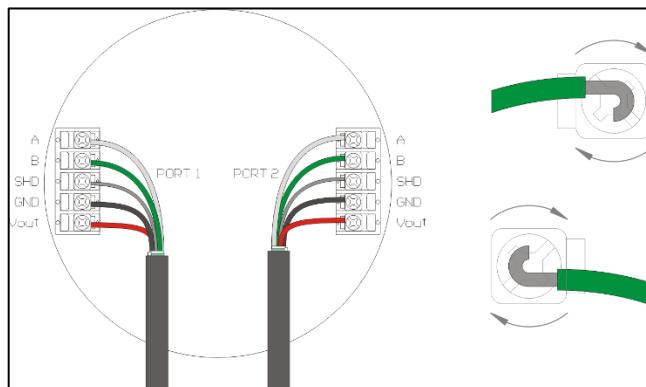


Figure 13: PCU wiring compartment

Figure 14: Sensor probe wiring  
(see 2.4.1 and 2.4.2 setup instructions)

## 2.4.1 Directly Mounting a Sensor Probe to the PCU

A directly mounted sensor probe is one that is screwed directly into the PCU body. For all other types see section 2.4.2: *Attaching a Remotely Mounted Sensor Probe to the PCU*.

- 1) Apply two wraps of PTFE tape around the  $\frac{1}{2}$ " NPT threads of the sensor probe in the clockwise direction according to *Figure 10: Direct mounted PTFE tape application*. Screw the sensor probe into one of the two  $\frac{1}{2}$ " NPT ports on the bottom of the PCU, removing the port plug if there was one installed. Ensure the sensor probe is tightly screwed to the PCU expecting that the gland does not screw in all the way due to the PTFE tape.
- 2) Prepare the sensor probe's cable end as shown in *Figure 12: Direct and remote sensor probe wire preparation*. Strip the outer jacket back 2" or 51mm, remove the fabric braid, foil and cloth wrapping. It is recommended to cut the wire lengths at 5mm decrements starting with the white wire, followed by green, shield, black and ending with the red wire. Strip the jackets 3mm to expose the inner conductors. Do not attempt to strip the shield wire as it has no jacket.
- 3) Feed the prepared sensor probe cable through a gland and into the PCU wiring compartment where two terminal strips labelled Port 1 and Port 2 are located. If you have not yet removed the PCU outer cover, do so and you will see the wiring compartment. Match the wires colors to the silkscreen of the wiring compartment. [WHT] is white, [GRN] is green, [SIL] is silver (the shield), [BLK] is black and [RED] is red. Port 1 and 2 have electrically identical ratings and you may connect an HCD or HCDW to either port. See *Figure 14: Sensor probe wiring* for a final wiring solution.
- 4) Screw the PCU outer cover on the wiring compartment to ensure a tight fit that won't come off easily. Enclosure threads should be free of dirt and other debris to prevent seizure of outer cover. Only tighten the outer cover by hand to avoid damaging the device.

*Field Replacement Instructions:* To replace directly mounted sensor probes on the PCU, unscrew the PCU outer cover by hand. Then detach all cable wires from Port 1 and/or Port 2 of the wiring compartment. Unscrew the direct mounted sensor probes from the two  $\frac{1}{2}$ " NPT ports on the bottom of the PCU. Finally, complete section 2.4.1 steps 1 to 4.

## 2.4.2 Attaching a Remotely Mounted Sensor Probe to the PCU

Remotely mounted sensors require installation of a cable gland.

- 1) Apply two wraps of  $\frac{3}{4}$ " wide PTFE tape around the gland threads in the clockwise direction according to *Figure 10: Direct mounted PTFE tape application*. Remove the port plug if one is installed and screw the gland into one of the two  $\frac{1}{2}$ " NPT ports on the bottom of the PCU. Ensure the gland is tightly screwed to the PCU expecting that the gland does not screw in all the way due to the PTFE tape.
- 2) Prepare the sensor probe's cable end as shown in *Figure 12: Direct and remote sensor probe wire preparation*. Strip the outer jacket back 2" or 51mm, remove the fabric braid, foil and cloth wrapping. It is recommended to cut the wire lengths at 5mm decrements starting with the white wire, followed by green, shield, black and ending with the red wire. Strip the jackets 3mm to expose inner conductors. Do not attempt to strip the shield wire as it has no jacket.
- 3) Feed the prepared sensor probe cable through a gland and into the PCU wiring compartment where two terminal strips labelled Port 1 and Port 2 are located. If you have not yet removed the PCU outer cover, do so and you will see the wiring compartment. Match the wires colors to the silkscreen of the wiring compartment. [WHT] is white, [GRN] is green, [SIL] is silver (the shield), [BLK] is black and [RED] is red. Port 1 and 2 have electrically identical ratings and you may connect an HCD or HCDW to either port. See *Figure 14: Sensor probe wiring* for a final wiring solution.
- 4) Tighten the cable gland around the cable until the gland has a firm grip. You should see the rubber insert compress and exit the tip of the gland a bit. Screw the PCU outer cover on the wiring compartment ensuring a tight fit that won't come off easily. Enclosure threads should be free of dirt and other debris to prevent seizure of the outer cover. Only tighten the outer cover by hand to avoid damaging the device.

*Field Replacement Instructions:* To replace remotely mounted sensor probes on the PCU, unscrew the PCU outer cover by hand. Then detach all cable wires from Port 1 and/or Port 2 of the wiring compartment. Loosen the cable gland(s) and remove the cables from the interior of the PCU. Finally, complete section 2.4.2 steps 1 to 4.

**WARNING: This system is certified intrinsically safe. Sensor replacement may be performed in the field without a hot work permit.**

**WARNING: Only sensors provided by Syscor are compatible with this device.**

**WARNING: When replacing a sensor, proper care should be taken to ensure that surrounding environment is free of hydrocarbons.**

## 2.5 Battery Packs

The standard size battery pack contains two Lithium-Thionyl Chloride D size cells with a nominal voltage of 7.2V and ampacity of 19.0Ah. The extended size battery pack contains four Lithium-Thionyl Chloride D size cells with a nominal voltage of 7.2V and ampacity of 38.0Ah. Do not recharge! Remove and store battery packs at room temperature when the device is not in use to ensure optimal battery lifespan. Please read the warnings regarding field replacement at the end of section 2.5.

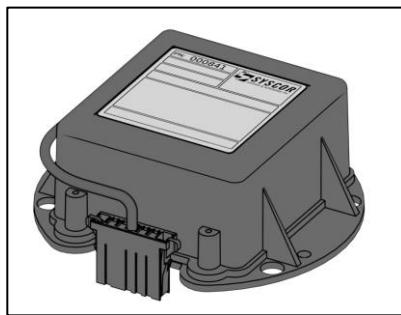


Figure 15: Standard size battery pack

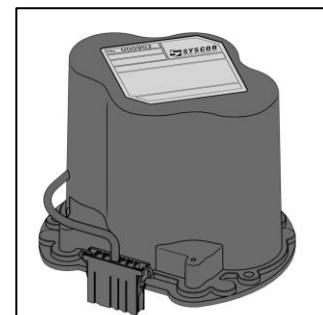


Figure 16: Extended size battery pack

## 2.5.1 Battery Installation/Replacement Procedure

1. Unscrew the outer cover from the side closest to the mounting bosses.
2. If replacing a battery, remove Qty. 3 M4x6mm Button Head screws from standoffs on battery holding board using a 2.5 mm hex key tool. Disconnect the battery harness from the connector and remove the battery pack. Skip this step and proceed to step 3 if a battery is not present in the device.
3. Slide replacement battery pack into enclosure according to the battery pack size in *Figure 17: Battery Compartment Exploded View* below.
4. Install Qty. 3 M4x6mm screws to secure the battery using a 2.5 mm hex key tool.
5. Plug battery harness into connector.
6. Hand-tighten the outer cover onto the PCU body.

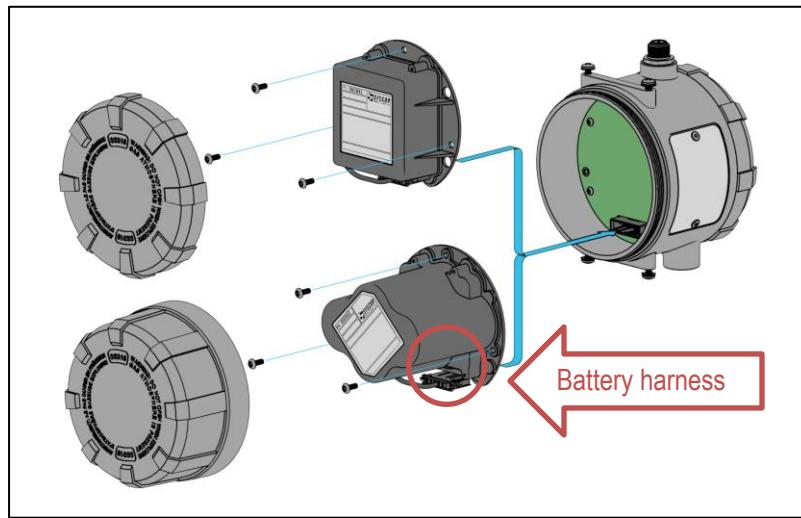


Figure 17: Battery compartment exploded view

**WARNING:** Battery replacement may be performed in the field without a hot work permit.

**WARNING:** Only battery packs provided by Syscor are compatible with this device.

**WARNING:** Batteries are not rechargeable.

**WARNING:** Follow local restrictions and guidelines for disposal of lithium batteries.

## 2.6 Antenna Placement Considerations

Antennas are connected via an industry standard N-Type connector. The antenna may be remotely mounted using an N-type extension cable or screwed in directly.

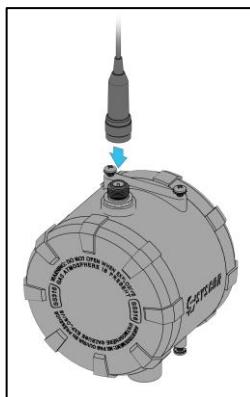


Figure 18: Antenna connection

## 2.7 Network Configuration

Network configuration must be performed after battery installation in order to maximize battery life. Devices that have not been configured will spend energy searching for a network to join. A Network Identity (ID) and Join Key are required to join a WirelessHART™ network and they must match the Network ID and Join key of the WirelessHART™ Gateway.

Network configuration can be completed using any HART handheld communicator. The HART terminals are located inside the intrinsically safe front wiring compartment and are clearly marked.

### 2.7.1 Download Device Description

Download the latest device description at <https://www.syscor.com/products>.

Note: HART Registration of this device is pending. When achieved, you will also be able to download the latest device description at [www.hartcomm.org](http://www.hartcomm.org).

## **3 Operation**

### **3.1 Normal Operation**

Under normal operation, three variables are transmitted at variable update rate using burst message 0. The update rate is programmable from 1 second up to 3600 seconds. Burst messages can be configured using the device descriptor and a Field Communicator. For information about communicating with this equipment, Modbus tables and other software manuals, visit the manufacturer's download page at <https://syscor.com/support/downloads>.

## 4 Drawings

Unless otherwise specified, all dimensions are in millimeters (mm).

### 4.1 Power and Communication Unit (PCU)

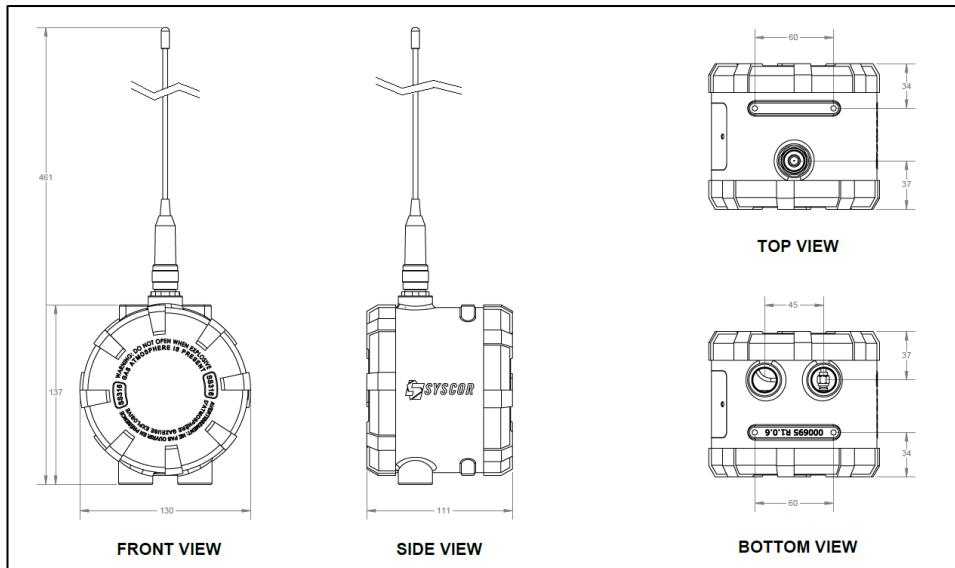


Figure 19: Power and communication unit (PCU)

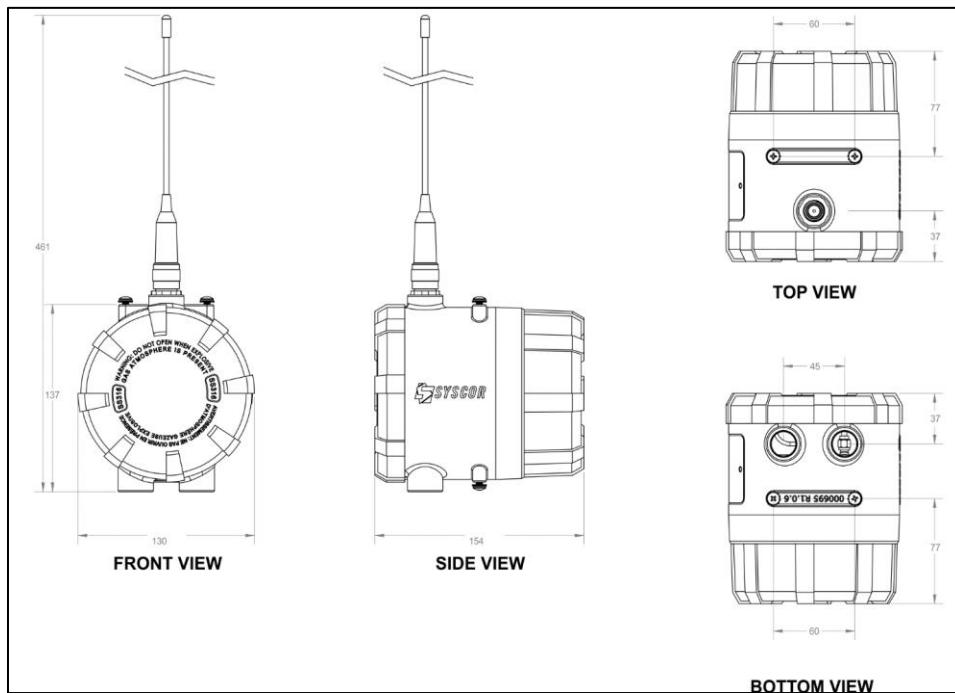


Figure 20: Power and communication unit (PCU) with extended outer cover

## 4.2 Hydrocarbon Liquid and Vapor Detector (HCD)

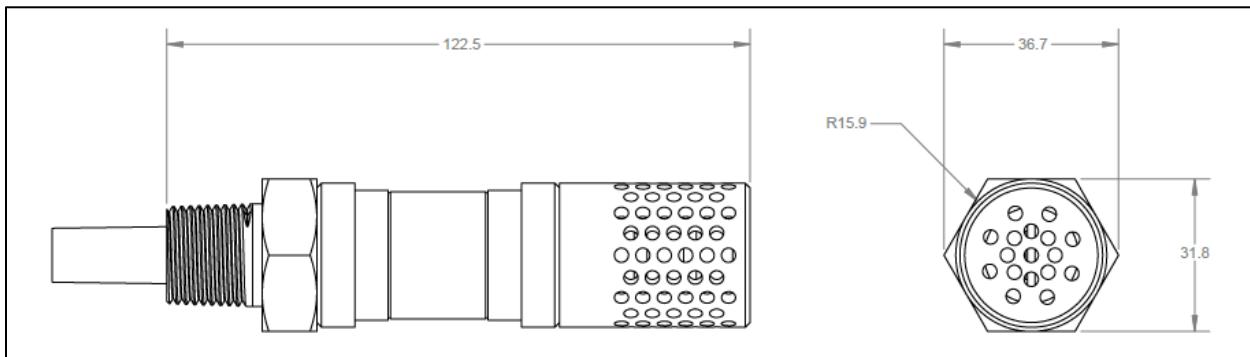


Figure 21: Hydrocarbon liquid and vapor detector (HCD)

## 4.3 Hydrocarbon Liquid and Vapor Detector with a Water Level Sensor (HCDW)

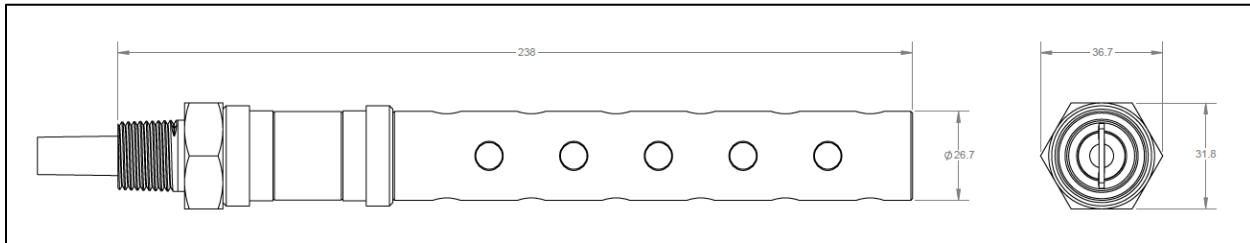


Figure 22: Hydrocarbon liquid and vapor detector with water level sensor (HCDW)

## 4.4 Generic Mounting Bracket

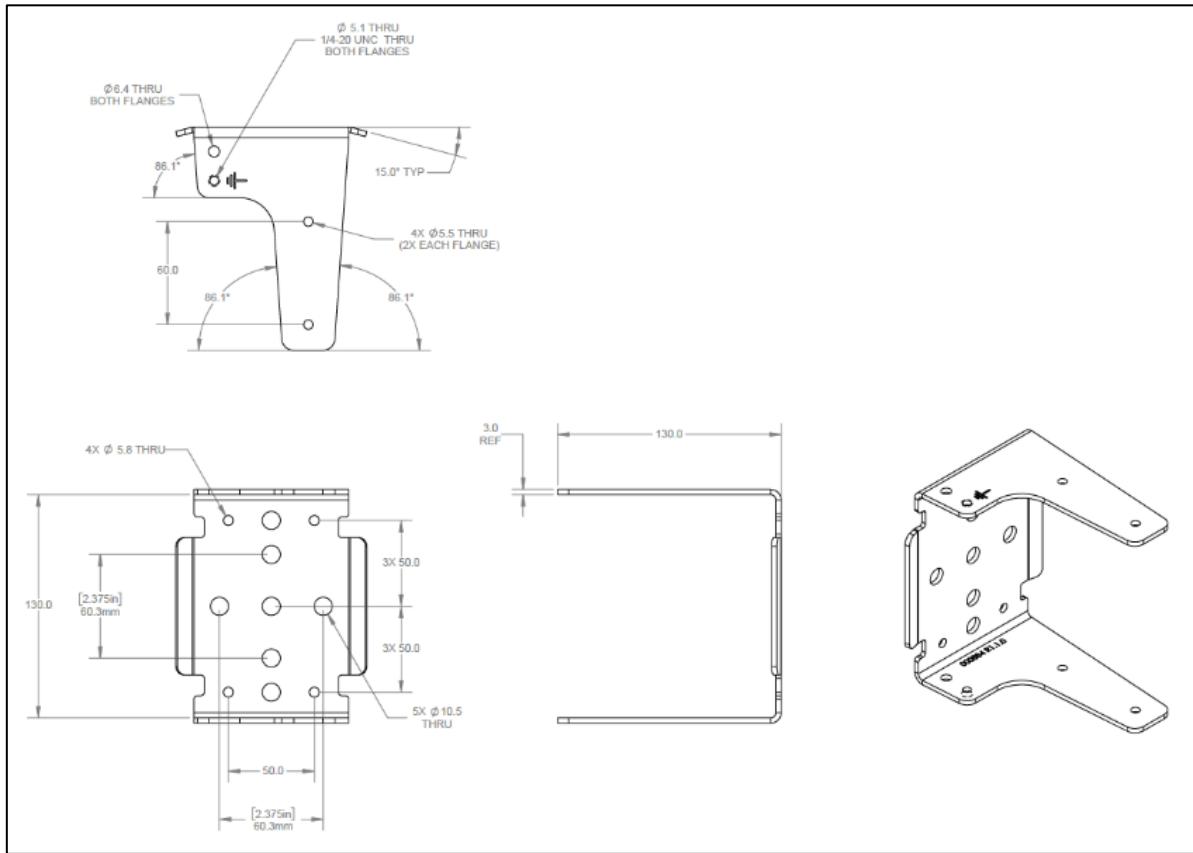


Figure 23: Generic mounting bracket

## 4.5 Magnetic Mounting Bracket

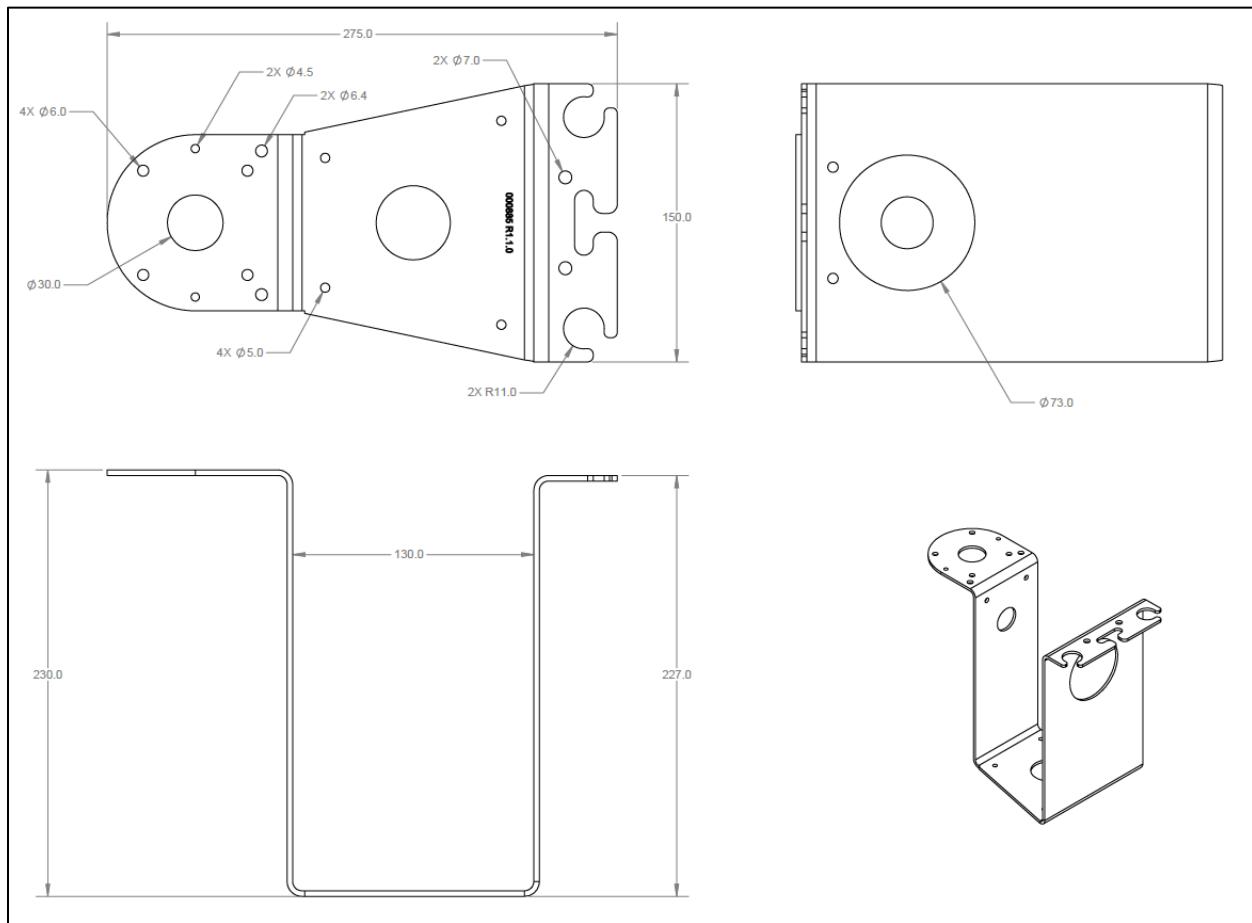


Figure 24: Magnetic mounting bracket

## 4.6 System Wiring Diagram

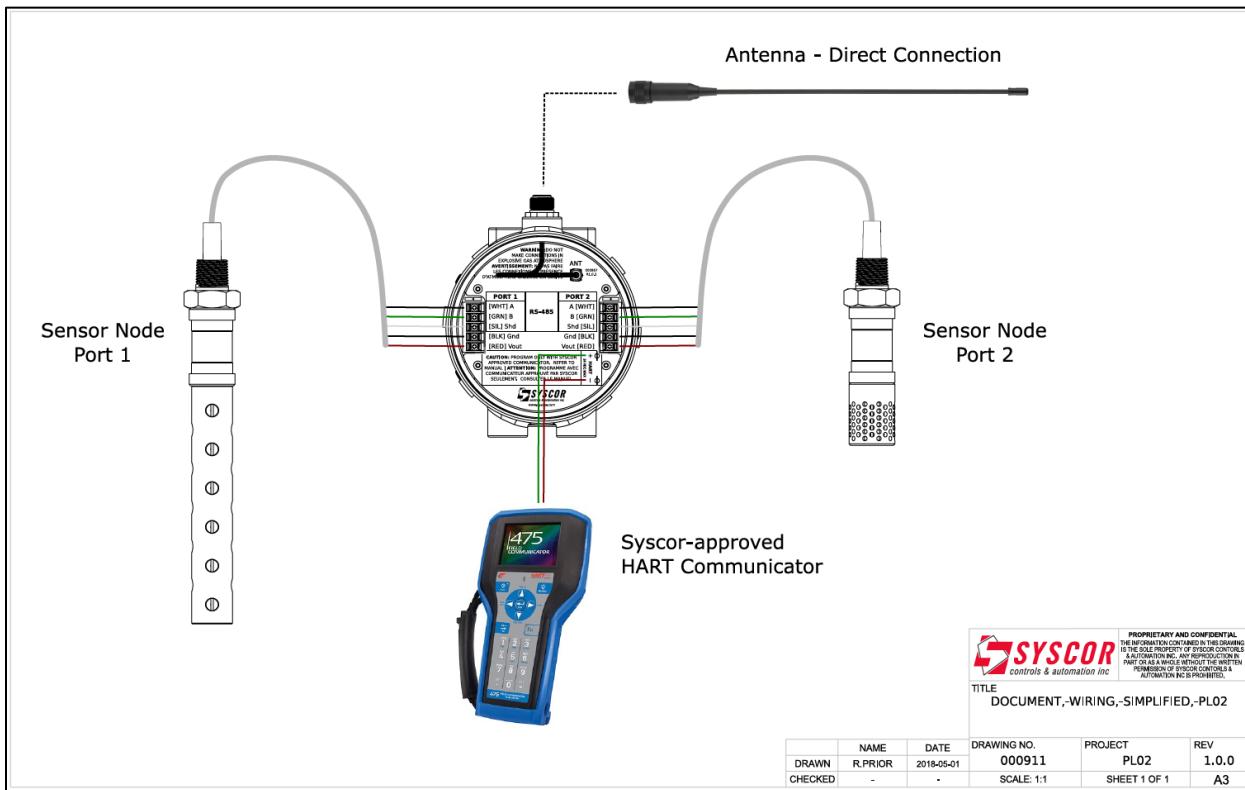


Figure 25: System wiring diagram

## 4.7 Cable Gland

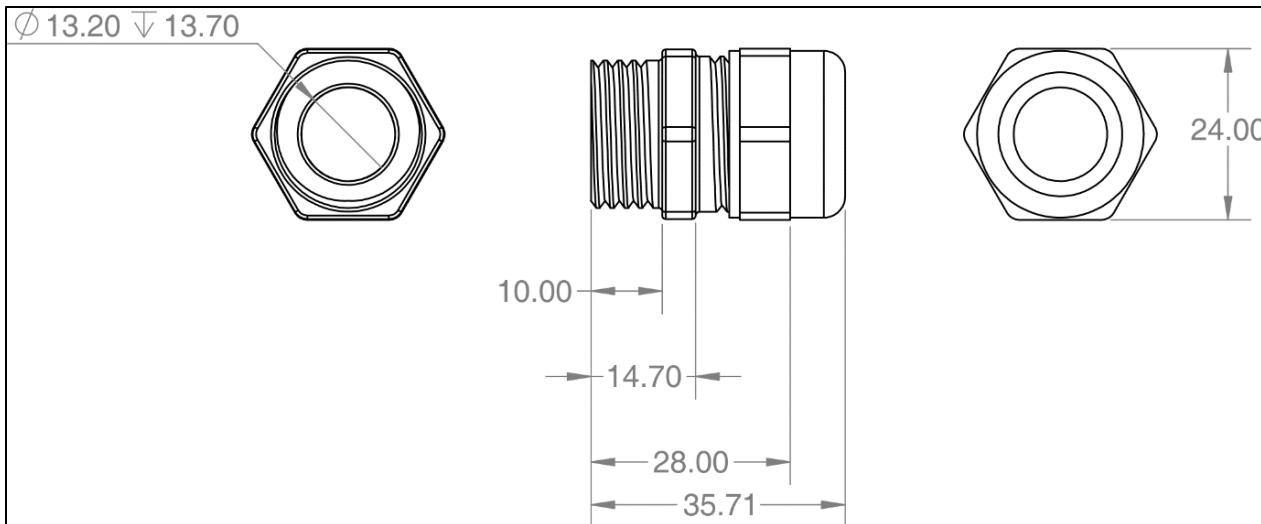


Figure 26: Cable gland

## 5.0 Acronyms

NPT: National pipe thread

PCU: Power and communication Unit

PTFE Tape: Polytetrafluoroethylene tape, also known as Teflon tape

HCD: Hydrocarbon liquid and vapor detector

HCDW: Hydrocarbon liquid and vapor detector with a water level sensor

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